

*New England*, 1st, 4th to 6th, 8th, 10th, 19th, 24th, 25th.  
*Middle Atlantic states*, 1st, 3d, 4th, 9th, 18th, 22d to 24th, 26th, 29th.  
*South Atlantic states*, 1st, 13th, 18th, 22d, 26th.  
*East Gulf states*, 17th, 20th, 24th, 25th, 30th.  
*West Gulf states*, 3d, 4th, 6th, 8th, 20th, 24th, 27th.  
*Tennessee*, 5th, 6th, 11th, 18th, 28th.  
*Ohio valley* 1st to 6th, 8th, 11th, 12th, 17th, 18th, 20th, 21st, 24th, 27th, 28th.  
*Lower Lake region*, 1st, 4th, 5th, 7th, 9th, 18th, 19th, 22d, 23d, 25th, 26th, 29th.  
*Upper Lake region*, 10th, 12th, 16th, 17th, 18th, 21st to 26th, 28th.  
*Upper Mississippi valley*, 4th to 7th, 11th, 12th, 21st, 23d, 24th.  
*Missouri valley*, 3d to 6th, 18th, 29th.  
*North Pacific coast region*, 2d, 12th, 13th, 29th, 30th.  
*Middle Pacific coast region*, 4th, 7th, 10th, 11th, 14th, 16th, to 19th, 21st, 22d, 28th to 30th.

Solar halos were also reported from the following stations not included in the districts named above: Key West, 9th, 10th, 16th, 19th; Santa Fé, New Mexico, 2d, 12th; Salt Lake City, 12th, 29th; Umatilla, Oregon, 13th; Dayton, Washington, 29th; Carson City, Nevada, 11th; San Diego, California, 9th; Campo, California, 27th.

#### LUNAR HALOS.

*Lunar halos* have been observed in the various districts on the following dates:

*New England*, 4th, 26th, 29th.  
*Middle Atlantic states*, 2d, 4th, 8th, 14th, 16th, 23d, 25th, 28th, 29th.  
*South Atlantic states*, 1st, 3d, 5th, 19th, 27th, 28th, 30th.  
*East Gulf states*, 24th, 26th, 27th, 29th, 30th.  
*West Gulf states*, 3d, 4th, 23d to 25th, 27th, 29th; Tennessee, 5th, 21st, 26th; Ohio valley, 3d to 6th, 13th, 23d, 25th, 28th.  
*Lower lake region*, 1st, 3d, 10th, 26th.  
*Upper lake region*, 1st, 3d to 6th, 8th, 16th, 20th, 22d to 26th, 29th.  
*Upper Mississippi valley*, 1st, 3d to 6th, 22d, 23d, 25th, 26th.  
*Southern slope*, 1st to 3d, 23d, 24th, 26th, 30th.  
*Northern slope*, 22d, 25th.  
*Southern plateau*, 1st, 2d, 28th, 29th.  
*North Pacific coast region*, 28th, 29th.  
*Middle Pacific coast region*, 1st, 4th, 22d, 26th, 30th.

Lunar halos were also reported from the following stations not included in the districts named above: Fort Brown, Texas, 3d; Fort Yates, Dakota, 27th; Yankton, Dakota, 20th; Protem, Missouri, 3d, 4th; Fort Washakie, Wyoming, 29th; Pike's Peak, Colorado, 2d; Spokane, Washington, 1st; Winnemucca, Nevada, 8th; Salt Lake City, Nevada, 2d, 22d, 29th; Umatilla, Oregon, 23d, Boise City, Idaho, 29th; Visalia, California, 1st, 28th, 30th.

#### MIRAGE.

Rio Vista, California, 17th; Alexandria, Dakota, 4th, 15th, 28th, 29th; Indianola, Texas, 23d, 29th.

#### MISCELLANEOUS PHENOMENA.

##### SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 187 stations show 5,494 observations to have been made, of which 25 were reported doubtful; and of the remainder, 5,469, there were 4,539, or 83.0 per cent., followed by the expected weather.

##### SUN SPOTS.

The following record of observations has been forwarded by

Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

DATE— Ap'l, 1882.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 1 p. m.	1	2	0	0	0	0	6	30†	Spots probably disappeared by solar rotation.
2, 1 p. m.	2	10†	0	0	0	0	8	40†	
4, 3 p. m.	0	15	2	10	0	0	5	40†	
7, 4 p. m.	3	20†	2	15			6	45†	
9, 1 p. m.	1	5	0	5	1	5	7	45†	Many of the spots very small.
12, 1 p. m.	2	25†	1	5	2	20†	8	65†	
13, 1 p. m.	0	5	1	3	0	5	5	55†	
16, 12 m.	1	30†	0	0	1	2	6	85†	
17, 6 p. m.	1	35†	0	5	1	2	7	125†	Many of the spots small. Three large groups of spots probably disappeared by solar rotation.
18, 5 p. m.	2	40†	1	2	0	0	8	160†	
20, 1 p. m.	0	0	1	10†	0	0	7	125†	
21, 2 p. m.	1	1	1	5	1	1	7	110†	
24, 2 p. m.	0	0			0	0	3	24†	Spots probably disappeared by solar rotation.
25, 1 p. m.	0	0	0	6	0	0	3	14	
28, 4 p. m.	1	8	1	8	0	0	3	12	
30, 12 m.	1	8	2	6			1	8	

†Approximated. Faculae were seen at the time of every observation.

Mr. William Dawson, at Spiceland, Indiana, reports: 1st, eight groups, thirty-three spots; 4th, six groups, fifty-six spots; large group of small spots in northeast quadrant and large spot east of centre; 5th, seven groups, sixty spots; 11th, eight groups, thirty-six spots; large group east of centre; 12th, seven groups, sixty-five spots; several large groups east of centre; five of the spots very large; several others quite prominent; very large spot and prominent penumbra at east edge; air very poor; 13th, five groups, sixty-five spots; the large spot is 1' from east edge; 14th, seven groups, seventy-five spots; one spot quite large; many others quite prominent; air poor; 15th, nine groups, one-hundred and forty spots; one very large group in southwest quadrant; the eastern group easily seen without telescope; 16th, eight groups, one-hundred and sixty spots, twelve of which are large and twelve others quite prominent; 17th, nine groups, one hundred and seventy-five spots; two very large groups south of centre; one easily seen without telescope; six groups, ninety-five spots; one visible without glass; 24th, three groups, thirty-five spots; one large group has disappeared; one large spot west of centre; 25th, three groups, thirty spots; 27th, five groups, twenty-five spots; 28th, three groups, twenty spots, all of which are small; 30th, three groups, eighteen spots. Mr. David Trowbridge, at Waterburg, New York, reports: 3d, six groups, twelve spots; faculae in west; 7th, seven groups, twelve spots; faculae in east; 15th, seven groups, twenty-two spots, several of which are large; one group in east easily seen without telescope; one large group in west; 16th, seven groups, twenty-five spots; one group has disappeared and one appeared by rotation. There are visible ten spots included in one penumbra in the large group which is still plainly visible without telescope; it occupies fully one-fifteenth of the solar diameter; 17th, six groups, twenty-two spots; one group has disappeared and another is very faint; the large group still seen with unassisted eye; 18th, six groups, twenty-six spots; one group has appeared and one has disappeared by rotation; two groups now visible without telescope; 22d, four groups, seven spots; the two large groups near west margin are no longer visible without telescope, one of which was visible for six days without aid of glass; 23d, light groups, twelve spots; 24th, four groups, seven spots; one large group has disappeared by rotation; 25th, three groups, seven spots; faculae near the large group and in the east; 26th, two groups, four spots; large group has disappeared by rotation; 29th, one group, one spot; faculae; 30th, one group, three spots; faculae in east. Mr. H. D. Govey, at North Lewisburg, Ohio, reports: Sunspots were observed on every clear day during the month; they were largest and most active from fifteenth to twenty-first; smallest and least numerous on twenty ninth and thirtieth; the groups and spots were exceedingly large from seventeenth to nineteenth.

The following record of observations has been forwarded by

Mr. A. G. Bender, Sacramento, California: "Fourth, two p. m., four groups, fifteen spots; two new groups, nine spots, appeared since the thirty-first ultimo; fourth and fifth, four groups, fifteen spots; eleventh, two p. m. six groups, twenty-five spots; one new group, nine spots; one group, one spot reappeared by rotation; twelfth, four p. m., six groups, thirty-five spots; one group, five spots, has disappeared by rotation and one group, five spots, has reappeared by rotation; thirteenth and fourteenth, six groups, forty spots; fifteenth, four p. m., seven groups forty-five spots; one new group, one spot; sixteenth, four p. m., six groups, forty spots; one group, one spot has reappeared by rotation, and one group, one spot has disappeared; seventeenth, 3.30 p. m., six groups, forty-five spots; one new group, three spots; one group one spot has disappeared by rotation; 18th, half-past three p. m., six groups, forty spots; 20th, half-past three p. m., five groups, forty spots, one group, one spot has disappeared by rotation; 21st, half-past three p. m., six groups; one new group, one spot; 22d, half-past three p. m., six groups, forty spots; 23d, four groups, thirty-five spots; one group, ten spots has disappeared by rotation; new spots have appeared in the old groups; 24th, half-past three p. m., three groups, twenty spots; one group, ten spots has disappeared by rotation; 25th, half-past three p. m., two groups, ten spots, some of which are faint; one group, ten spots, has disappeared by rotation; 26th, two groups, ten spots; 27th half-past three p. m., one group, one spot; ten spots has disappeared by rotation; 28th, two groups, three spots, one new group, two spots; 29th, one group, two spots; one group, one spot has disappeared by rotation; Thirtieth, three-thirty p. m., one new group, six spots; one group, two spots has disappeared by rotation. At all observations during the month, when ten or more spots have been reported, the number given is estimated. At Winnemucca, Nevada, twentieth, two large spots were observed on the sun through an ordinary marine glass. They were also visible on twenty-first, Cincinnati, 17th. Prof. Stowe, of the Cincinnati Observatory reports, that the largest number of sun spots ever observed here were seen this morning, numbering three hundred and sixty in seven distinct groups, two of which could be seen with the unassisted eye. They could also be seen without the aid of the telescope on the nineteenth.

The following report was made by Mr. Arthur Binns, second officer, on the s. s. "City of Paris," of the Inman Line, and furnished through the courtesy of the New York Herald Weather Service: at noon of April 22nd, in 49° 03' N., 22° 00' W., a black spot was observed on the sun's surface about 6' from the southwest edge.

#### METEORS.

Rio Vista, California, 12th; Monticello, Iowa, 26th; Woodstock, Maryland, 16th; Protem, Missouri, 6th; Somerville, New Jersey, 18th; Moorestown, New Jersey, 16th; North Volney, New York, 16th; North Lewisburg, Ohio, 16th; Stateburg, South Carolina, 10th, 20th; Cedar Keys, Florida, 14th; Yuma, Arizona, 5th, 28th. The following reports of a remarkable meteor were received too late to appear in the March REVIEW:

Fort Assinaboine, Montana, March 8th, 8.30 p. m., an enormous meteoric stone fell southeast of station, lighting up the surrounding country as if caused by a vivid flash of lightning. Upon striking the earth a violent jar was felt resembling an earthquake shock, which was followed by a loud report like that of a cannon. The interval between the shock and report is variously estimated from four to eight minutes. At Fort Benton, Montana, about 10 p. m. a shock like that produced by an earthquake was felt. At Coal Banks, Montana, a bright glare was observed, followed a few minutes later by a loud report. A trembling of the earth was distinctly felt.

#### MIGRATION OF BIRDS.

*Geese flying northward:* Somerset, Massachusetts, 2d, 14th, 26th; Fall River, Massachusetts, 8th; Newport, Rhode Island,

30th; Clear Creek, Nebraska, 17th, 20th; Moorestown, New Jersey, 12th; Readington, New Jersey, 23d; Embarrass, Wisconsin, 29th, 30th; Shreveport, Louisiana, 23d; Grand Haven, Michigan, 19th; Port Huron, Michigan, 29th; Fort Yates, Dakota, 1st; Bismarck, Dakota, 15th; Huron, Dakota, 2d, 3d, 4th.; Springfield, Massachusetts, 3d; Red Bluff, California, 14th, 21st, 22d.

*Geese flying southward:* Fort Missoula, Montana, on the 11th. *Cranes flying northward:* Monticello, Iowa, on the 2d.

*Sand Hills flying northward:* Monticello, Iowa, 2d.

*Ducks flying northward:* Monticello, Iowa, 2d; Lansing, Michigan, 1st, Indianola, Texas, 29th; Des Moines, Iowa, 29th; Huron, Dakota, 2d, 3d, 20th.

#### POLAR BANDS.

New Corydon, Indiana, 1st, 3d, 12th, 18th, 21st, 23d, 24th, 25th, 27th, 28th; Dana, Iowa, 21st; Fayette, Mississippi, 8th; Freehold, New Jersey, 22d; Vineland, New Jersey, 15th; Wytheville, Virginia, 10th, 12th, 27th, 28th; Florence, Arizona, 10th, 12th.

#### ZODIACAL LIGHT.

New Corydon, Indiana, 15th, 16th; Monticello, Iowa, 11th, 14th, 26th; Yates Centre, Kansas, 16th; Cornish, Maine, 17th; Fall River, Massachusetts, 17th; Cambridge, Massachusetts, 5th, 7th, 8th, 12th, 16th, 17th, 18th, and suspected on the 23d; Atco, New Jersey, 8th, 12th, 13th, 16th, 17th, 18th; Franklin, Wisconsin, 14th; Lynchburg, Virginia, 16th; Nashville, Tennessee, 8th, 16th, 17th; Leavenworth, Kansas, 16th; Dayton, Washington, 6th, 11th, 17th.

#### WATERSPOUTS.

Captain N. S. Tracy, of the American brig "Teneriffe," reports: April 30, in 32° 31' N, 77° 17' W., saw several waterspouts.

#### EARTHQUAKES.

Portland, Or., 30th, 10.48 p. m., a slight shock of earthquake lasting about two seconds, followed about three seconds later by a more severe shock accompanied by a low rumbling sound of from five to seven seconds duration. Every building in the city was shaken and persons sleeping were aroused. In the larger buildings, the shock was more sensibly felt. The direction of the wave seemed to be from a point north of east to a point south of west. The shock was by far the most severe ever felt in this city. No damage was done other than the excessive fright caused. It is reported from Oregon City, that two distinct shocks were felt at that place; one being very slight and the other heavy; and at 12.25 a. m. of May first, another slight shock was felt.

Olympia, Washington territory, 30th, 10.50 p. m., severe earthquake shock; wave seemed to be from west to northwest, followed by a succession of tremblings, lasting six or eight seconds, and then by a heavy shock, almost throwing persons from their feet; large trees were swayed to and fro as from a heavy blast of wind; clocks were stopped and crockery broken; two chimneys in the city were thrown down. The ground seemed to have an undulatory motion. Duration of the entire shock was about twenty-five seconds. Fort Canby, Washington territory, 30th, 10.50 p. m., four distinct earthquake shocks were felt at this place, lasting about fifteen seconds; vibration from southwest to northeast. Victoria, British Columbia, 30th, 10.45 p. m., a shock of earthquake lasting several seconds was felt at this place; vibration from west to east.

San Francisco, California, 13th, 6.30 a. m., a sharp earthquake shock, of a vibratory motion from north to south, was felt in this city, lasting about four seconds.

New Market, Virginia, 2d, several earthquake shocks were felt in this section; the direction of movement being northeast and southwest; some of the houses were perceptibly shaken.

#### PRAIRIE AND FOREST FIRES.

Alexandria, Dakota, 10th, to 15th; Monticello, Iowa, 7th;

Creswell, Kansas, 7th, 8th, 12th, to 15th, 20th, 24th, 26th, 29th; Protem, Missouri, 3d, and 21st; De Soto, Nebraska, 14th, 25th; Wytheville, Virginia, 19th; Fort Gibson, Indian territory, 4th, 5th, 6th, 11th, and 14th; Moorhead, Minnesota, 15th, 28th; Yankton, Dakota, 1st, 13th, 24th, 26th; Tobacco Garden, Dakota, 1st, 4th; Ferry's Landing, Montana, 1st, 3d, 12th, 13th, 21st; North Platte, Nebraska, 9th, 18th, 25th.

#### DROUGHT.

Indianola, Texas, 26th, crops are suffering from drought; flower and vegetable gardens are seriously affected. Coleman City, Texas, 21st, the wheat crop in this section has been destroyed by drought; farmers are cutting it to be used for hay. Henrietta, Texas, drought is seriously affecting crops; farmers fear that their entire crop will be a failure unless the drought soon ends.

#### INSECTS.

Lewiston, Idaho, 2d, grasshoppers are appearing in this vicinity in large numbers. Little Rock, Arkansas, 2d, a small insect called the buffalo gnat, which appears to come out

of the ground, especially in the prairie and swamp lands, have appeared in the city in great numbers and are very troublesome; they are most annoying and do the most damage near the overflowed districts, where it is necessary for owners of stock to build fires through the forest for protection. Horses and cattle will stand in dense volumes of smoke to avoid the bite of the insect; much stock has been killed by them within the past few days, and deer suffer from their ravages.

#### SAND STORMS.

Fort Yuma, California, 6th, 9th, 10th, 16th, 17th, 20th; Fort Garland, Colorado, 6th; Fort Stanton, New Mexico, 5th, 6th, 7th, 8th, 21st; Clear Creek, Nebraska, 3d; Stockton, Texas, 21st; Phoenix, Arizona, 6th, 10th, 13th, 15th, 16th, 20th; Santa Fé, New Mexico, 16th; Camp Thomas, Arizona, 3d, 4th, 6th, 7th, 10th, 11th, 14th, 16th, 17th, 20th, 21st, 29th, 30th; Winnemucca, Nevada, 15th, 19th, 22d, 23d, 24th; Umatilla, Oregon, 6th; Visalia, California, 2d; Yuma, Arizona, 3d, 6th, 9th, 10th, 16th, 20th, 21st; Lincoln, Nebraska, 3d; severest sand storm that has been known in this state for many years.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR :

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Chief Signal Officer, U. S. A.*

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